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# **Phase Diagrams for Ceramists**

## **Volume VI**

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The Phase Diagrams published in this volume were collected and reviewed by the Phase Diagrams for Ceramists Data Center, located in the National Measurement Laboratory of the National Bureau of Standards. We are pleased that this cooperative effort between the American Ceramic Society and the National Bureau of Standards continues to provide important reference information to the ceramics community.

David R. Lide, Jr., Chief  
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$\text{Dy}_2\text{O}_3\text{-ZrO}_2$  (concl.)

(C)

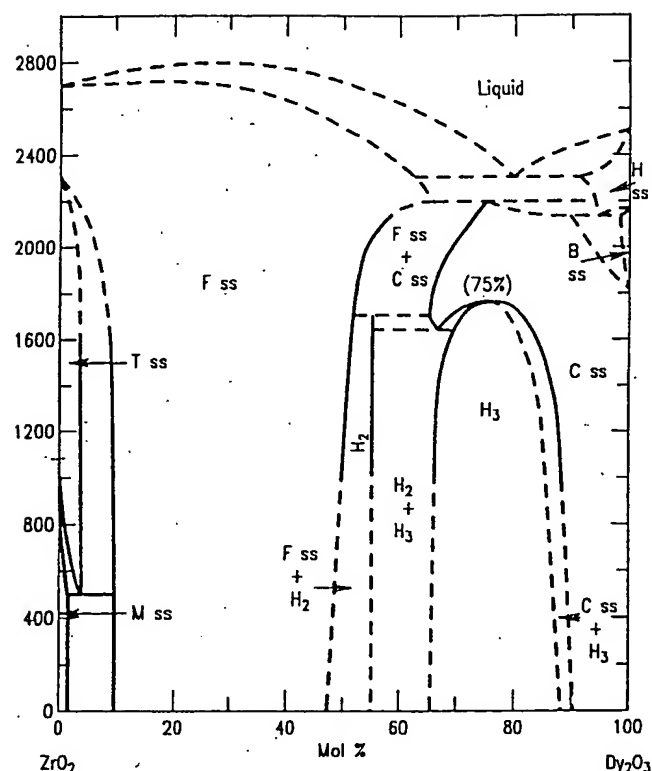


Fig. 6464—System  $\text{Dy}_2\text{O}_3\text{-ZrO}_2$ . (A) Zirconia-rich region of the tentative zirconia-dysprosia system; (B) effect of dysprosia on tetragonal-monoclinic transformation temperature of zirconia on cooling; (C) phase diagram for zirconia-dysprosia system. M, Mon = monoclinic; F = cubic fluorite-type; T, Tet = tetragonal; C = cubic rare earth oxide-type;  $\text{H}_2$  =  $\text{M}_7\text{O}_{11.5}$ -type;  $\text{H}_3$  =  $\text{M}_7\text{O}_{11}$ -type; H = hexagonal high temperature rare earth oxide-type; B = monoclinic rare earth oxide-type.

C. Pascual and P. Duran, *J. Mater. Sci.*, 15 [7] 1701-1708 (1980).

Zirconia (99.8%) and dysprosia (99.9%) were mixed by grinding, pressed, and sintered at  $1300^\circ\text{C}$ . They were then refired at  $1800^\circ\text{C}$  or melted in a solar furnace, reground, pressed into pellets, and heated to  $1765^\circ\text{C}$  in air, using wire wound furnaces in air or gas firing. A few firings above  $2000^\circ\text{C}$  were in flowing Ar-5%  $\text{H}_2$ . Compositions were investigated at 5% intervals and were contained in Pt foil below  $1250^\circ\text{C}$ .

Temperatures were controlled by thermocouples to  $1750^\circ\text{C}$ , and by optical pyrometer at higher temperatures. Quenched specimens were analyzed by X-ray diffraction. High temperature X-ray diffraction, to  $1500^\circ\text{C}$  in air, was used to analyze specimens containing 0 to 10%  $\text{Dy}_2\text{O}_3$ .

The diagrams are in essential agreement with the closely related  $\text{ZrO}_2$ -rare earth systems. See Figs. 2363 and 5211 for somewhat differing results. The depression of the  $\text{ZrO}_2$  transformation is as expected.

D.R.W.

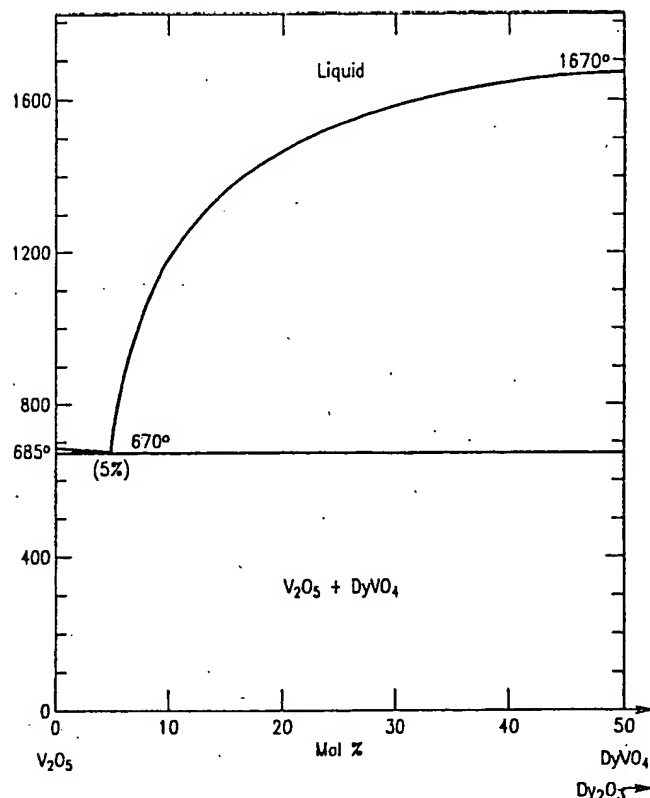
 $\text{Dy}_2\text{O}_3\text{-V}_2\text{O}_5$ 

Fig. 6465—System  $\text{V}_2\text{O}_5\text{-DyVO}_4$ .

G. A. Rykova, O. N. Ustalova, V. M. Skorikov, and I. V. Tananaev, *Zh. Neorg. Khim.*, 24 [1] 183-187 (1979); *Russ. J. Inorg. Chem. (Engl. Transl.)*, 24 [1] 102-105 (1979).

Experimental details are the same as those described in the commentary accompanying Fig. 6476. The orthovanadate compound,  $\text{DyVO}_4$ , was found to melt congruently. The presence of V(IV) in these compounds could not be detected by magnetic susceptibility measurements. The enthalpy of formation ( $670^\circ\text{C}$ ) of the orthovanadate was determined to  $\pm 3\%$  from DTA traces, using  $\text{CaCO}_3$  as a calibration standard.

$\text{DyVO}_4$  is tetragonal and of the  $\text{ZrSiO}_4$  type. See Fig. 2364 for the polymorphism of  $\text{DyVO}_4$  under pressure.

M.F.B.

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